

CLAIMS

We claim:

1. A system for displaying information from a first display source and from a second display source on a display device, the system comprising:
 - a presentation surface set associated with the display device;
 - a first display memory surface set associated with the first display source;
 - a second display memory surface set associated with the second display source;

and

a graphics arbiter, distinct from the first display source and from the second display source, for transferring display information from the first display memory surface set and from the second display memory surface set to the presentation surface set.
2. The system of claim 1 wherein the presentation surface set comprises a primary presentation surface and wherein the graphics arbiter transfers display information to the primary presentation surface.
3. The system of claim 1 wherein the presentation surface set comprises a presentation flipping chain, the presentation flipping chain comprising a primary presentation surface and a presentation back buffer, and wherein the graphics arbiter transfers display information to the presentation back buffer.
4. The system of claim 3 wherein transferring comprises transferring display information to portions of the presentation back buffer that are changed relative to a buffer immediately preceding the presentation back buffer in the presentation flipping chain.
5. The system of claim 3 further comprising:
 - a comparator for comparing contents of the presentation back buffer with contents of a buffer immediately preceding the presentation back buffer in the presentation flipping chain and, if the contents match, for inhibiting a flip in the presentation flipping chain.

6. The system of claim 1 wherein the first display memory surface set comprises a display flipping chain.
7. The system of claim 1 wherein the graphics arbiter comprises components in the set: software executable, hardware, and firmware executable.
8. The system of claim 1 wherein the graphics arbiter notifies the first display source of a time when a frame was displayed on the display device.
9. The system of claim 1 wherein the graphics arbiter notifies the first display source of a first estimated time when a future frame will be displayed on the display device.
10. The system of claim 9 wherein the graphics arbiter notifies the first display source in association with receiving an indication of a refresh of the display device.
11. The system of claim 9 wherein the first display source deinterlaces video to prepare display information in the first display memory surface set, the deinterlacing based, at least in part, on the first estimated frame display time.
12. The system of claim 9 wherein the first display source interpolates video to prepare display information in the first display memory surface set, the interpolating based, at least in part, on the first estimated frame display time.
13. The system of claim 1 wherein the graphics arbiter notifies the first display source of a time when a scan line was displayed on the display device.
14. The system of claim 1 wherein the graphics arbiter enables processing by the first display source.
15. The system of claim 1 wherein the graphics arbiter provides occlusion information to the first display source.

16. The system of claim 1 wherein the graphics arbiter transforms display information from the first display memory surface set.
17. The system of claim 16 wherein transforming comprises performing an operation in the set: stretching, texture mapping, lighting, highlighting, translating from a first display format into a second display format, and applying a multi-dimensional transformation.
18. The system of claim 1 wherein the graphics arbiter receives per-pixel alpha information from the first display source and wherein the graphics arbiter uses the per-pixel alpha information received from the first display source to merge the display information from the first display memory surface set and from the second display memory surface set for transfer to the presentation surface set.
19. The system of claim 1 further comprising a third display source distinct from the graphics arbiter, wherein the graphics arbiter reads a drawing instruction from the third display source and performs the drawing instruction to write to the presentation surface set.
20. The system of claim 19 wherein the drawing instruction instructs the graphics arbiter to perform an operation in the set: deinterlacing video, interpolating video.
21. A computer-readable medium containing instructions for providing a system for displaying information from a first display source and from a second display source on a display device, the system comprising:
- a presentation surface set associated with the display device;
 - a first display memory surface set associated with the first display source;
 - a second display memory surface set associated with the second display source;
- and
- a graphics arbiter, distinct from the first display source and from the second display source, for transferring display information from the first display memory surface set and from the second display memory surface set to the presentation surface set.

22. A method for a graphics arbiter, distinct from a first display source and from a second display source, to display information from the first display source and from the second display source on a display device, the method comprising:
- gathering display information from a first display memory surface set associated with the first display source;
- gathering display information from a second display memory surface set associated with the second display source; and
- transferring display information from the first display memory surface set and from the second display memory surface set to a presentation surface set associated with the display device.
23. The method of claim 22 wherein gathering display information from a first display memory surface set comprises gathering display information from a ready buffer in a display flipping chain of the first display memory surface set.
24. The method of claim 22 wherein transferring display information comprises transferring display information to a primary presentation surface of the presentation surface set.
25. The method of claim 22 wherein transferring display information comprises transferring display information to a presentation back buffer of a presentation flipping chain of the presentation surface set.
26. The method of claim 25 wherein transferring display information comprises transferring display information to portions of the presentation back buffer that are changed relative to a buffer immediately preceding the presentation back buffer in the presentation flipping chain.

27. The method of claim 25 further comprising:
comparing contents of the presentation back buffer with contents of a buffer
immediately preceding the presentation back buffer in the presentation flipping chain and,
if the contents match, inhibiting a flip in the presentation flipping chain.
28. The method of claim 22 further comprising:
transferring display information to the first display memory surface set.
29. The method of claim 22 further comprising:
notifying the first display source of a time when a frame was displayed on the
display device.
30. The method of claim 22 further comprising:
notifying the first display source of an estimated time when a future frame will be
displayed on the display device.
31. The method of claim 30 wherein the notifying of the first display source is associated
with receiving an indication of a refresh of the display device.
32. The method of claim 30 wherein the first display source deinterlaces video to prepare
display information in the first display memory surface set, the deinterlacing based, at
least in part, on the estimated frame display time.
33. The method of claim 30 wherein the first display source interpolates video to prepare
display information in the first display memory surface set, the interpolating based, at
least in part, on the estimated frame display time.
34. The method of claim 22 further comprising:
notifying the first display source of a time when a scan line was displayed on the
display device.

35. The method of claim 22 further comprising:
enabling processing by the first display source.
36. The method of claim 22 further comprising:
providing occlusion information to the first display source.
37. The method of claim 22 further comprising:
transforming display information from the first display memory surface set.
38. The method of claim 37 wherein transforming comprises performing an operation in the set: stretching, texture mapping, lighting, highlighting, translating from a first display format into a second display format, and applying a multi-dimensional transformation.
39. The method of claim 22 further comprising:
receiving per-pixel alpha information from the first display source; and
using the per-pixel alpha information received from the first display source to merge the display information from the first display memory surface set and from the second display memory surface set for transfer to the presentation surface set.
40. The method of claim 22 further comprising:
reading a drawing instruction from a third display source distinct from the graphics arbiter; and
performing the drawing instruction to write to the presentation surface set.
41. The method of claim 40 wherein performing the drawing instruction comprises performing an operation in the set: deinterlacing video, interpolating video.

42. A computer-readable medium containing instructions for performing a method for a graphics arbiter, distinct from a first display source and from a second display source, to display information from the first display source and from the second display source on a display device, the method comprising:

gathering display information from a first display memory surface set associated with the first display source;

gathering display information from a second display memory surface set associated with the second display source; and

transferring display information from the first display memory surface set and from the second display memory surface set to a presentation surface set associated with the display device.